U.S. NAVY MEDICINE

November-December 1986

U.S. NAVY MEDICINE

Vol. 77, No. 6
November-December 1986

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COVER: Marines patrol a Norwegian wood during NATO exercise Northern Wedding '86. For medical aspects of the operation see page 9. Photo by PH2 Ken Crowder, SACLANT Public Information Office.

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U.S. NAVY MEDICINE is published from appropriated funds by authority of the Naval Medical Command in accordance with Navy Publications and Printing Regulations P-35. Second class postage paid at Philadelphia, PA, and additional mailing offices. ISSN 0364-6807. The Secretary of the Navy has determined that this publication is necessary in the transaction of business required by law of the Department of the Navy. Funds for printing this publication have been approved by the Navy Publications and Printing Policy Committee. Articles, letters, and address changes may be forwarded to the Editor, *U.S. Navy Medicine*, Department of the Navy, Naval Medical Command (MEDCOM 00D4), Washington, DC 20372-5120. Telephone (Area Code 202) 653-1237, 653-1297; Autovon 294-1237, 294-1297. Contributions from the field are welcome and will be published as space permits, subject to editing and possible abridgment.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

NAVMED P-5088

POSTMASTER: Send change of address orders to U.S. Naval Publications and Forms Center, ATTN: Code 306, 5801 Tabor Avenue, Philadelphia, PA 19120.

Accentuating the Positive

It is sometimes human nature to see our cup as half-empty when, in reality, it should be looked upon as half-full. As we approach the end of 1986 and look toward the future, there are some positive things we should be pointing to with a sense of satisfaction, as well as some challenges which Navy medicine faces in the year ahead.

Our goal of quality care is at a high state of realization. With 13.8 million outpatient visits and more than 250,000 admissions per year, our system has a very high efficiency quotient. Our need for additional personnel and financial assets to handle this large and growing load is clear, and we continue to pursue these needs with vigor even during times of cost containment and exceptional budget scrutiny. It is important that our shipmates throughout the Navy and Marine Corps understand that we are doing our worldwide job with one-third fewer doctors per capita than either of our sister services, and that we continue to need assets in order to redress the more important of these shortages.

The activation of USNS *Mercy* and USNS *Comfort* will bring new challenge to our ability to operate these important forward-deployed systems and still handle our other commitments. We will realize important benefits both in experience and in proving our capability to operate in distant parts of the world, as well as a valuable test of our ability to provide seaborne medical care anywhere if we ever again need confront large-scale combat overseas. The opportunity to work with and improve American relations with our foreign medical colleagues, and to provide essential services to those in need, is an important national task as well as one which brings distinction to the unique capabilities of our Navy and Navy medicine.

The continued viability of Graduate Medical Education programs, one of the long-term necessities for quality medical care, must remain one of our highest priority concerns both within the Medical Department and in our contacts with those outside Navy medicine who must know of its importance to the future benefit of all in the Navy and Marine Corps. Related to that is our individual need for a conscious, personal effort to improve our capabilities in an environment where all aspects of our profession, from that of the corpsman to the most sophisticated medical specialties, are advancing at such a rapid rate. We must look to our own growth in these challenging times, and to the increased capability and satisfaction which this growth provides us.

Finally, a vitally important area in which each of us in Navy medicine has a personal opportunity to contribute in even greater measure is in the area of provider-patient relations. While the majority of our patient-contact people from corpsmen to doctors are sensitive to the feelings, needs, and concerns of our patients, this is an area in which we can and must do better in the year ahead. Personalized, thoughtful, individualized contact with patients by everyone who deals with them is an important part of the treatment which people come to us to receive. The most technically, medically competent care fails professionally if it does not also consider that the human element in treatment of the patient as an individual is an essential part of making that person well.

Navy medicine has an enormous record of things to be proud and pleased about, a record of achievement and dedication second to none, a worldwide record of competent, innovative treatment under the broadest range of conditions. Having done so many of these things, we continue to be asked to do more, and that is our challenge for the future.

RADM Joseph S. Cassells, MC

Dr. Katz and HN3 Dionisio A. Nicholas, Jr., discuss the progress of a patient in the operating room. Below: USS New Jersey (BB-62)

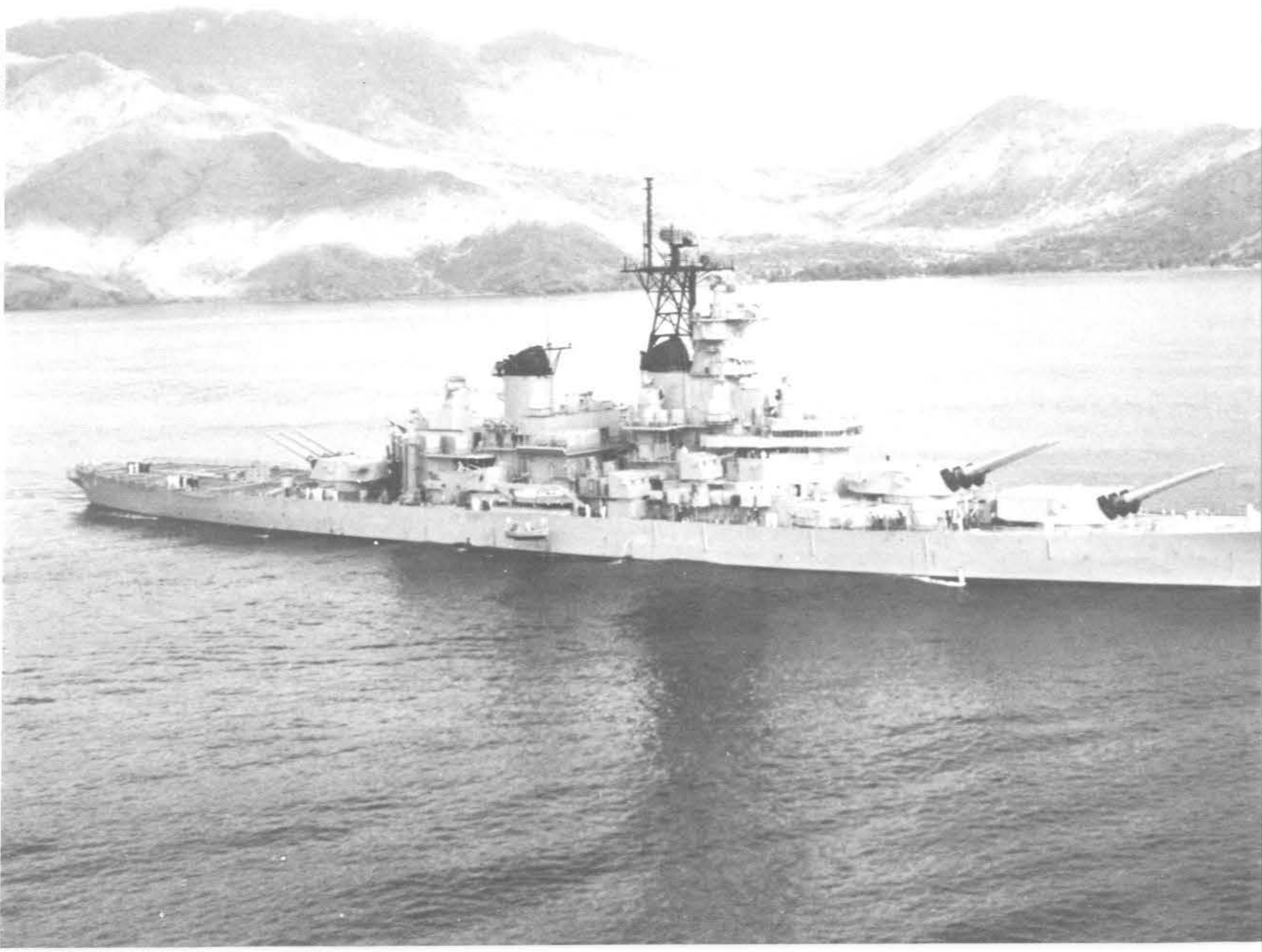
New Jersey's Temporary Surgeon

CAPT Robert I. Katz is a veteran of the Naval Reserve, but today is serving aboard the battleship USS *New Jersey*.

"I retired from the Naval Reserve in January 1985, after 41 years of service," CAPT Katz said. "But I came back on temporary active duty because the Navy needed a surgeon aboard *New Jersey*."

Having served on active duty for 2 years during World War II and 2 years during the Korean conflict, Dr. Katz said, "I'd often wondered what it would be like to serve aboard the historic battleship. Now I'm experiencing it. I remember hearing about *New Jersey* during my career in the Naval Reserve. Since the ship needed a qualified surgeon for the second half of her

PHCS Steve Harris



deployment to the Western Pacific, when the Navy asked me to be that surgeon I was happy to oblige."

Dr. Katz has taken a sabbatical from his private practice to serve with the first battleship battle group to deploy to the Western Pacific since Korea.

New Jersey is the lead ship of Battle Group Romeo, commanded by RADM R.A.K. Taylor, Commander, Cruiser-Destroyer Group One. RADM Taylor is embarked aboard the nuclear-powered cruiser USS *Long Beach*. *New Jersey* and the other battle group ships have been deployed to the Western Pacific since May.

Before joining the medical staff, Dr. Katz served 2 months in the Surgery Department at Naval Hospital, Long Beach, CA, where he first heard of the opening aboard the battleship.

Another reason he decided to ride *New Jersey* was because he thought it would "be a nice change of pace from the daily routine of seeing patients, making hospital rounds, and teaching classes."

Katz has had a medical practice in southern California for over 25 years, and is also an instructor for the University of Southern California's (USC) and the University of California at Los Angeles' (UCLA) medical schools.

Dr. Katz has faced some challenges aboard *New Jersey* which he had not anticipated. "One has to handle certain medical problems on board that would otherwise be handled by sending a patient to a specialist," he pointed out. "You really have to have an open mind and be prepared to do a lot more than a regular surgeon would be required to accomplish."

Comparing military medicine with his civilian practice, Katz finds that "Navy medicine reflects the trends and problems found in civilian medicine. One of those is liability as reflected in the high cost of malpractice insurance in the civilian community. The fears of malpractice accusations have now reached the military."

Dr. Katz examines a patient during sick call in New Jersey's *medical ward.*

The liability problem is being taken care of by the Navy's quality assurance program. According to CAPT Katz, "Pressure is being applied to Congress to lift the ban on suing military physicians. Therefore the military doctor, just like his civilian counterpart, has become gun-shy—in other words, more cautious about everything. "That's why military and civilian doctors are requiring additional tests and consultations with other physicians more than ever before."

Katz feels Navy medicine has come a long way since he first joined the service. He is especially happy about the Navy finally giving doctors an opportunity to practice medicine rather than do paperwork. "The new career path the Navy has started for medical professionals allows medical officers a choice. Under the new program, senior Navy medical officers have two career paths open to them. They can stay in clinical medicine treating patients or they can become administrators."

Katz believes that had the program been instituted years ago, many doctors would still be on active duty. He maintains that they would have continued practicing medicine instead of having to get involved with the administration portion of military medicine, which, until now, consumed so much of a senior medical officer's time.

Although he looks forward to returning to his civilian medical practice, he was glad to be aboard *New Jersey.* "I'm enjoying my temporary tour of active duty. But, like other sailors, I'm anxious to get home. □

—Story by JO2 Roy Steinfeld. Photos by PH3 Jose Orta, Public Affairs Office, USS *New Jersey.*

Victims of Terrorism

CDR Carole Jewett, NC, USNR

You are working in a small military hospital somewhere in the Pacific or Europe. For the past 72 hours a group of terrorists have held hostage a JAL 747 with 250 passengers. Several passengers have been beaten and two were killed by the terrorists. The U.S. Delta Force has just "resolved" the hostage situation and some of the victims are to be sent to your military treatment facility for initial assessment and treatment. What kind of behavior can you expect from the victims? How should you react? What kind of emotional first aid should you offer?

As you know, this scenario has been played out in Europe and, given the inexorable expansion of terrorist activities and the targeting of Americans everywhere, it is only a matter of time before we see similar action in the Pacific basin.

As military health care providers, we are in a unique position to receive victims of terrorist actions. It is essential, therefore, that we understand the behavioral dynamics of terrorist victims in order to provide effective treatment of hostages from the moment of release.

Victim Responses During Captivity

What do hostages experience under their captors? All victims, be they incarcerated criminals, POW's or terrorist hostages, share a particular range of stress-inducing situations including loss or limitation of freedom, loss of power over one's fate, and some kind of relationship to one's captor.(*1*)

Extreme isolation and restraint are often seen in terrorist victims. In 1973 the British Ambassador to Uruguay, Sir Geoffrey Jackson, was kidnapped by the Tupamaros and confined to a cage 6 by 2 feet wide for 8 months. Another form of imprisonment experienced by victims of almost all hijackings, is being under constant observation 24 hours a day with no privacy at any time. This constant exposure, seen even in our own prison system, can be a deep blow to one's dignity and self-esteem.

One victim recorded his own emotional reaction to confinement in a skyjacked plane: "By afternoon, armed men began to pass through the plane in a steady stream, hour after hour, staring curiously. This aroused feelings of revulsion, degradation, dehumanization, and vague threat. Distinctly, we felt impotent, confined, constricted, and like animals in a zoo."(*2*)

Related to loss of freedom is the "why" of that loss. A criminal is seen as having at least been master of his own destiny at one time and that his loss of freedom is self-induced. The kidnapped victim is an item to be used in exchange for something else. Even POW's are taken to reduce the fighting potential of the enemy. Their captivity has a purpose. But victims of hijackings or hostage incidents such as the TWA hijacking or the U.S. Embassy kidnappings in Tehran, are seen only as symbols without personality or individual value. There is no answer to the question: "Why me?" To become the object of completely meaningless events can be devastating to one's dignity as well as limiting one's ability to deal rationally with the situation. The victim cannot draw on his natural "fight or flight" instinct, for to do either could very well be fatal.

Coping Behaviors

Although coping behavior varies with the setting as well as with the individual, in situations of extreme threat and chaos, one's mental health during and after the event depends a great deal on the victim's ability to master at least some aspect of his environment. There are several ways human beings can achieve this mastery. One way is, of course, to fight back. But terrorists do not see their victims as individuals—only symbolic objects to be used as a means to an end. Any sign of human individuality, especially in the beginning of an action, can be fatal. On the other hand, ex-hostages who stood up to their captors and got away with it, have suffered less psychological trauma than those who had been more submissive. Society adds a double bind to the victim's ordeal. When the victim fights back and is not hurt, he is a hero. If he is hurt, he is a reckless fool.

All in all, studies have indicated that those victims who can cope with varieties of normal stress prior to capture are more able to retain their personality and system of values intact.

The most common and effective coping mechanism has been identification with the hostage-takers. This phenomenon is known as the Stockholm Syndrome and is named after the hostages in a Stockholm bank robbery in 1973 who, when the incident was concluded, verbally attacked the police and defended the criminals. It is an automatic, unconscious emotional response, not a rational choice by the victim. This behavior has been observed across cultures and involves a high level of stress as individuals face a life-threatening situation where they regress to an earlier stage of ego development to stay alive. According to Anna Freud, this phenomenon of

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identification with an aggressor is an attempt by the ego to protect itself against authority figures who have generated anxiety.(*3*) Another term for this type of identification is "introjection." Kaplan and Sadock describe introjection as the internalization of a feared object's malicious or aggressive characteristics and serves to avoid anxiety by symbolically putting those characteristics under one's own control. (*4*)

The Stockholm Syndrome can be seen then as a regression to the extreme dependent state of infancy where the all-powerful adult is again present and the outside world is again threatening. As much as the rational mind desires freedom, rescue is seen as an extremely fearful, life-threatening situation. The results of this conflict can sometimes be a complete acceptance of the aggressors' values and cause. The introjection can even be confused with feelings of love. Probably the most striking example of this was Patty Hearst. Society finds it difficult to accept or forgive hostages who have "turned" and yet this very relationship to one's captor is now fostered by the police since it has proven to be a key factor in hostage survival. It is the captor/parent who decides who should live and who shall die. Positive feelings by the hostage are often reciprocated by the hostage-taker. As the infant identified with a parent, so now the frightened adult identifies with his captor for physical and ego survival. If a bond is established, a life may be spared.

Short-Term Psychological Reactions of Ex-Hostages

Upon release and return to the "real world," the ex-hostage begins to experience considerable guilt feelings. Some of this is survivor guilt but a large part is guilt for not having resisted his captors more. If the Stockholm Syndrome manifested itself in behavior during the incident, the victim will try to rationalize his actions. Upon release, the victims are still in the grips of traumatic infantilism. The sudden freedom can trigger renewed crying, clinging, and submissive behavior as identification with their captors is transferred to the rescuers.

Within the group, anger toward any member who did not behave in an "acceptable" manner can occur. With time, this anger and rejection will diminish as the shared experience draws the group together.

Another common stress reaction is intrusive waking images or undesired mental pictures of the hostage event. Vietnam vets call these "flashbacks." Many hostages use this particular reaction as an index of their overall readjustment. The frequency of the images declines with time.

Many ex-hostages feel a strong need to retell their story over and over. It serves as an important way of regaining mastery over the experience and putting the events in a familiar context.

Short-Term Treatment

It is especially important in the acute phase of a victim's responses after release to recognize his need to ventilate. He will need to express feelings of hostility toward those involved in negotiations for his release as well as feelings of pathological transference toward his captors. Nonjudgmental listening is essential as well as reassurance that his behavior during captivity was fully acceptable.

Restore a sense of power by offering choices and asking permission whenever possible. If the ex-hostage is receiving medications, offer a choice of schedules. Knock before entering his room. Address him by last name until invited to do otherwise. Always identify yourself and ask permission to sit down in the victim's presence. It is also important to allow the victim to clean up before seeing visitors or the press. Give the victim privacy without isolation.

Diminish the victim's helpless, hopeless feeling by allowing him to determine his own behavior. Provide a flexible treatment regimen with input by the victim. Avoid placing the ex-hostage in the stereotyped patient role. Whenever possible, allow the individual to remain in his own clothes, order his own meals, sleep when he chooses.

If more than one ex-hostage is in the same treatment facility, provide opportunities for group sessions to share grief, anger, fear, etc. and to receive support and guidance from the staff. This also allows the victim to confront and work through his feelings rather than attempt to escape and deny. On the other hand, some terrorist victims may choose to leave for home as soon as possible. They may simply not have the mental or emotional energy or interest in working through certain feelings so soon after release, especially with strangers. However, a minimal amount of reflection and sharing in a sympathetic environment might be beneficial in the long run.

These then, are a few of the social and psychodynamics of hostage behavior during captivity and immediately after release. A basic understanding of these dynamics is essential in order to provide the earliest effective clinical treatment.

Unless severely wounded, it is unlikely that any released hostages will stay very long in a military treatment facility. Most will return to their own familiar environments as soon as they can and if necessary, seek further counseling toward their long-term adjustment. But for those general health care providers who might encounter newly released hostages, sensitivity to their unique experience and behavioral response early on will surely help in their eventual recovery.

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Let's Recognize Our Outstanding Performers

The Navy Awards System

RADM L.E. Angelo, MSC, USN

For the past 2 years I have served as the chairman of the Naval Medical Command Awards Board. In that position, I have had the responsibility to review and recommend action on award nominations from the Naval Medical Command claimancy. That experience has left me with the distinct impression that too many people in the Medical Department do not appreciate or understand the military awards process—and that as a result, we sometimes hurt ourselves. Just recently I attended a retirement ceremony for a well-respected Navy health care professional, a leader in his field. He retired after 22 years of service with no personal awards for his contributions. Not that he didn't deserve them—his commanding officers never took the time and trouble to recommend him.

Historically, the Medical Department has been among the Navy communities least likely to acknowledge individual excellence through the presentation of personal decorations. Although the trend recently has been encouragingly upward, if the last 5 years are averaged, the Medical Department claimancy has presented about 500 individual awards/year among the 30,600 hospital corpsmen and dental technicians, 3,900 Medical Corps, 2,400 Medical Service Corps, 1,800 Dental Corps, and 3,000 Nurse Corps officers.

Statistics are not readily available to compare the Medical Department with other communities, but a cursory glance at the chests of our shipmates leaves the impression that we compare poorly.

In the Medical Department we work hard, have high standards of excellence, and are an irreplaceable part of the Navy team. When our people perform well—and they do, each and every day—we are not allowed to give them pay raises or bonuses as a reward. Personal recognition in the form of letters or medals are the only way we can properly give recognition for truly outstanding performance.

Perhaps one reason so few awards are given is that our standards are so high. A moment's reflection reveals that the only acceptable standard for Navy medicine is EXCELLENCE! Substandard actions are not tolerated, and when people do maintain the high standards we hold, our first response is all too often, "Well, that's what the member is expected to do." But, requiring excellence does not preclude rewarding excellence.

I have also heard variations of the idea that "military awards are inappropriate for people working in medical treatment facilities and only those in operational assignments should receive awards." Such an attitude only fosters the myth that somehow the Medical Department is different from and set apart from the "real Navy." The battlefront for the war against disease and disability is our entire health care delivery system. There are few in the Navy community more deserving.

Finally, this lack of recognition may be a matter of no more than bad habits. If a manager does not bother—because he is "too busy," or remembers 2 weeks before a member's PRD (and decides it is too late), he is guilty of poor personnel management practices. And who suffers? Not just the deserving member; we all do. Positive reinforcement is the best motivator of professionals, and to miss a chance to give that reinforcement is inexcusable. The following guidelines are offered to help understand the significance of awards and to assist managers in obtaining them for deserving personnel.

Personal Awards: What Do They Signify?

Once it has been decided that an individual's performance was worthy of a military award—that a contribution was made which was clearly above and beyond the call of duty—the first thing which must be decided is the level of the award.

Usually, the appropriate level of award is quite clear. For a specific *achievement,* any award up to and including the Navy Commendation is usually given. An "achievement" is considered to constitute a specific action not recognized by another award, whose duration is usually less than 12 months. For outstanding *service,* awards ranging from the Legion of Merit to Letters of Commendation/ Appreciation are appropriate within the guidelines of the awards manual, SECNAVINST 1650.1E.

The same instruction also offers excellent guidelines in the timing of awards. An award for a specific act should be bestowed "as soon as possible with due consideration given for the time required to properly investigate the event, validate the facts, and process the award." Recognition of sustained superior performance is accorded at the end of the period of meritorious service.

For those people who transfer, a decision should be made as to where

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the award should be presented. Presentation after arrival at the new command announces the individual as an outstanding performer, but many would rather receive the award in front of the friends and colleagues with whom they worked as they earned it. Also, we must be certain not to forget the retiring serviceman or woman. Because they may not be able to wear the medal on their "service dress civvies," it is especially important that the award be processed in time for presentation at the retirement ceremony. To have the medal mailed to the member after retirement is not a very convincing statement of appreciation.

The Write-Up: Summary of Action

The *Awards Manual* is a well-written instruction which gives excellent direction in the preparation of awards, but to the uninitiated, can be formidable. It need not be a ponderous and time-consuming job to properly write an award recommendation and proposed citation. In fact, one criterion for the recommendation of an award is that if the individual has earned it, the recommendation almost writes itself!

The higher echelons of command that review the recommendations look for specifics in the summary of action. A good write-up, which provides the greatest opportunity for approval, will always contain the following elements.

1. **Introduction.** This sets the stage with a **standard phrase** found in the *Awards Manual* (I-17) for the degree of achievement of service for each level of award.

"LT Didgood, MSC, USN, distinguished himself through outstanding service as Chief of Operating Services at Naval Hospital, Corpus Christi from June 1982 to July 1985."

If his role or duties were unusual and would not be understood by a board, some amplification can be made, but basically this sentence is for identification purposes.

2. **Accomplishments.** The specific outstanding elements of performance should be listed as separate items. The **significance** to the command of each item should be described. This should be considered the most important element of the summary of action. When detailing the accomplishments, consider the following questions:

- **Initiative:** Did the individual show originality or personal initiative in problem identification/solving?
- **Dedication:** Was there unusual dedication and perseverance in the accomplishments?
- **Line of duty:** Was the accomplishment clearly above and beyond the expected?
- **Command impact:** Is the Navy better off because of the action? If so, specify why.
  - Operational readiness
  - Clinical practice
  - Management
  - Financial savings
  - Morale

"LT Didgood automated the data processing of outpatient visits and established a computer training program for data management personnel. This action resulted in the savings of thousands of man-hours and dollars while decreasing the error rate in log-ins from 5 percent to less than 1 percent."

The ***accomplishments*** section should not be embellished with a great deal of superlatives. A straightforward statement of the facts is more effective—this portion should *not* read like a highly praiseworthy fitness report. The elements should be separated into "bullet" form so that each tells a story of its own.

3. **Summary.** The subjective impression of the overall performance should be saved for the last paragraph. While superlatives in the accomplishments section can fog the point being made, the laudability of the member can be described here, and the overall impression and impact of the performance can be described.

"Through his ceaseless and untiring efforts, LT Didgood has demonstrated himself to be a superior leader, manager, and officer . . . reflecting great credit upon himself and the U.S. Navy."

Processed in this format, the nomination serves as a quality check. If the factual write-up supports the award, it has an excellent chance of approval. If not, all the hyperbole in the world will not support it, and the recommending officer should consider downgrading the recommendation to the next lower award.

The "citation" is, of course, a distillation of the major points presented in the summary of action, and as a rule should be no longer than 15 lines. Sample citations found in the *Awards Manual* are very useful "go bys.")

Awards Approval Process

An award recommendation can be initiated by *any officer* who is *senior* to the individual and has knowledge of the achievement or service which warrants the award. All recommendations are forwarded to the commanding officer of the individual for comment and/or recommendation. The burden of processing the award then lies with the addresses in the chain of command. If the awarding authority disapproves the award, the recommender of the action will be notified. Reconsideration of an award will only be undertaken if new and relevant evidence not available at the time of the original award is submitted.

When writing summaries of action, it should be kept in mind that only one award can be made for any act of achievement or service. Consideration of this limitation should be made when recommending a medal for a specific achievement which may compromise the award of a higher medal for service at a later date. Bestowal of a unit award does not limit individual awards.

Delay or oversight in an awards nomination does not preclude its later processing. There is a 3-year grace period following an achievement or service in which an award can be initiated and awarded. This should not be considered as rationale to delay awards, but a mechanism to take corrective action when appropriate. □

PH2 Ken Crowder, SACLANT

M-16 rifle at the ready, a marine defends his position during operation Northern Wedding.

Northern Wedding '86

A Medical Umpire's View

CAPT Richard D. Handy, MC, USN

Northern Wedding '86, a large NATO military exercise, took place in the fall of 1986 in and around Norway. Such an operational effectiveness demonstration (OED) is designed to demonstrate readiness to perform wartime missions. Lack of significant medical play sometimes limits opportunities for Navy Medical Department personnel to show their state of readiness. The critical importance of field training has made line commands reluctant to allow large numbers of personnel to be tagged as wounded and lost, even temporarily, from the prosecution of the operational mission. The success of a casualty treatment and evacuation chain depends on many special logistic and personnel arrangements as well as availability of medical skills. With few chances to practice in peacetime results in a long learning curve which means lives needlessly lost while we are getting up to speed in a real contingency.

An alternative approach to medical play was used in Northern Wedding '86. Reviewing the results of Teamwork '84, (see *U.S. Navy Medicine,* September-October 1984), a similar military exercise in which a total of only 10 casualty events occurred, RADM John D. Tolme, MC, USNR-R, and RADM J.A. Zimble, MC, then CINCLANT Surgeon, proposed the use of Naval Reserve medical personnel as casualty players. With the support of the line Navy and at little cost to the government, 55 ready reservists were selected to participate from over 600 volunteers from around the country. Gathering from Maine to California at Little Creek Amphibious Base, they received orientation and instruction prior to a flight by Naval Reserve C-9 to Norway.

The Naval Reserve casualty players included corpsmen (E3-E9), Medical Service Corps officers (both HCA and allied science) and one general surgeon. Casualty players also participated from the United Kingdom (military medical students) and from Norway (military medical trainees). Five observers from the United Kingdom and the Netherlands and five Norwegian medical service corps liaison officers provided evaluation and support. Five U.S. medical umpires participated from various commands including MEDCOM Code 41 (MC), Naval Hospital, Bethesda (MC), Naval Hospital, Portsmouth (MC, NC), and USS *Nassau* (MSC). Billeted in Swedish tents with wood stoves at a civilian campground near "Green Beach," an enthusiastic international spirit of camaraderie was quickly established.

Northern Wedding '86 spanned several months and locations. The major medical play took place over a 5-day period in early September, around the city of Sandefjord in southern Norway. Two U.S. Navy-Marine Corps amphibious task forces augmented by MMART teams and CATF surgeons from CONUS MTF's and one UK-NL task force (Royal Marines) landed to reinforce a friendly country against a foreign aggressor, while the Southern Norway Defense Command used our landing as an opportunity to repel an "invading aggressor" (Operation Blue Fox).

Planning for medical play was extensive and tightly coordinated among participating countries at pre-exercise conferences. Each day, five teams were dispatched to various locations for insertion of casualties. Each team consisted of casualty players, one observer-evaluator, one liaison officer, and one medical umpire. Casualties were inserted into the medical elements of the invading forces as they were deployed. Care was rendered and evaluated at battalion aid stations, beach evacuation stations, on trucks, ambulances, helicopters, and landing craft as well as secondary and primary casualty receiving and treatment ships. UK resources included field dressing stations, main dressing station, and a converted merchantman hospital ship. The Norwegians exercised their in-country military treatment and evacuation system including ambulances, helicopters, and a hospital train.

Medical events were mostly trauma with some disease-nonbattle injuries. Moulaged injuries were used to a limited extent. On day 3 of medical play, U.S. and UK-NL casualties were exchanged and processed through each others systems from formal dressing stations all the way to the ships where they stayed overnight. On day 4, a casualty exchange at sea took place.

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The British participants utilized air locks and positive pressure ventilation to defend against NBC agents in their main dressing station (MDR).

Our casualty players experienced the Norwegian system on day 5 as players were exchanged with the host nation. In all, over 300 casualty events were exercised. The observer-evaluators assessed the quality of care delivered while the umpires actively insured realism in time and equipment used in treatment.

The medical lessons learned in this exercise were many and varied:

- The operational commanders were uniformly supportive of the medical scenario, often prioritizing movement and treatment of casualties ahead of routine functions;
- The performance of various organic medical units reflected the degree of prior operational experience and practice and commitment to medical play; some units (BAS, BES, SCRTS, PCRTS) were immediately ready and committed to deliver care and evacuation while some improved with practice and instruction;
- Readiness and excellence in field and shipboard medical units depend on commitment and enthusiasm shown by the medical officer in charge and senior enlisted staff leadership;
- Casualties do not stop bleeding during transportation but require continued medical attention;
- Medically knowledgeable casualty players and moulaged wounds greatly enhance the quality of medical play for the care-givers;
- Use of Navy medical reservists is a viable alternative to support medical play in major military exercises and enhance Reserve training; and
- Cross-nation NATO casualty care is possible with maintenance of high quality of care and personnel accountability.

Finally, NATO awareness and commitment were enhanced. UK-NL participation was extensive and instructive. A visit to the Norwegian Military Medical Academy where all their armed forces personnel undergo 2 months of medical training was enlightening. And the hospitality of the host nation military liaison officers and especially the enthusiasm of the populace for our presence was astounding.

For future operations, these recommendations are offered:

- Medical play would be enhanced by pre-exercise instruction of participating medical officers and senior enlisted personnel prior to any exercise regarding the expected degree of commitment to medical play and readiness to provide care for real-world casualties regardless of resource availability;
- Use of Naval Reserve medical personnel as casualty players should be expanded;
- Cross-nation medical play should be emphasized in future NATO military exercises to establish and reinforce mechanisms of casualty evacuation and transfer; and
- Future military exercises of any size should include comparable medical play to shorten the medical learning curve. □

Formaldehyde Exposures at Work and Home

LCDR W.A. Spaul, MSC, USNR
F. Branscomb

Formaldehyde is a colorless gas with a very pungent odor. It is commonly found in liquid form as formalin, which is a 30–50 percent aqueous solution that also contains 10–15 percent methanol by volume. Since formaldehyde is highly reactive, the methanol is used as a stabilizer to inhibit polymer formation.

Recently, the public has expressed concern about formaldehyde because of the health effects found at low concentrations and its ubiquitous presence—at the jobsite, in our clothing, both mainstream and sidestream tobacco smoke, smog, some cosmetics and shampoos, and in our homes and recreational vehicles. Some of the highest exposures have been documented in the medical workplace. Formaldehyde and formalin solutions have been used as embalming and tissue preserving solutions, in the cleaning of renal dialysis units, as a disinfectant for thermometers, and as a preservative in the manufacturing of topical ointments and some pharmaceuticals.

Formaldehyde in cigarette smoke can be up to 40 ppm by volume. During experiments in test chambers that were 10 feet on each side (about the volume of an average size room), the burning of five cigarettes produced formaldehyde air levels of 0.23 ppm.(*1*)

Some very high air concentrations, up to 32 ppm, have been found in the home.(*2*) In general, the more frequently found formaldehyde air levels in older buildings is in the range of 0.03–0.06 ppm.(*3,4*) Within the home, there are several possible sources of formaldehyde. It can come from clothing, furniture upholstery, cooking, adhesives and glues, and in the offgassing from urea-formaldehyde foam insulation or urea-formaldehyde resins used in bonding particle board

Urea-Formaldehyde Resins in Consumer Products

Paper Products
- To Increase Wet Strength:
    - Grocery bags, wax paper, disposable female sanitary products, facial tissues, napkins, paper towels

Floor Coverings and Textiles
- Binders for Pigments and Fire Retardants:
    - Carpets, carpetbacking, clothing
- Stiffeners, Wrinkle Resistance:
    - Perma-press clothing
- Water Repellency:
    - Textiles of all types

Fertilizers
- Urea-Formaldehyde:
    - More uniform release rate of nitrogen

Disinfectants, Cosmetics
- Topical Ointments
- Preservative of Material

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and plywood, or in laminating veneers.

In clothing or textiles, formaldehyde resins are used as wrinkle suppressors, stiffeners, or in protective coatings of the materials, particularly in permanent press garments. This is the probable cause of eye irritation and the pungent odor that some people experience when shopping for clothing or textiles, particularly in imported materials. The authors have performed air measurements in dress boutiques where there have been complaints of eye irritation, and have measured formaldehyde air concentrations in these shops. The air concentrations ranged between 0.01 and 1.40 ppm.

The concentration of formaldehyde has been shown to increase as much as three times over the background level, just from the possessions and activities of the occupants after moving into a previously nonoccupied home.*(5)* Urea-formaldehyde foam has been a problem in conventional homes when it was used as an insulation that was sprayed between the walls. Urea-formaldehyde bonding agents have presented problems primarily in mobile homes or temporary offices, especially those constructed in the 1970's and early 1980's. In mobile homes and recreational vehicles, urea-formaldehyde bonding agents were used primarily in the manufacture of particle board and plywood—materials that have been used in the subflooring, walls, cabinets, and counter bases.

To date the U.S. Consumer Product Safety Commission has reported that it had received over 2,800 consumer complaints about formaldehyde that had involved over 5,000 persons. Of these complaints about 75 percent were from mobile home residents or owners of recreational vehicles, and the balance was from conventional home residents or persons exposed to pressed wood products in public buildings.*(6)* Aboard ships, Navy industrial hygienists have reported formaldehyde air concentrations of 4.5 ppm in a ship's storeroom where sandpaper was stored.*(7)* The sandpaper contained a urea-formaldehyde resin as an adhesive.

Health Effects

The most sensitive response to a formaldehyde exposure is usually eye, nose, and throat irritation with short-term exposures at low concentration (0.01–1.6 ppm).*(8)* Headaches, nausea, dizziness, and drowsiness may also be reported. For people who work with formalin or other formaldehyde-containing solutions, skin irritation often occurs. With repeat exposures, skin sensitization (allergic dermatitis) has been reported. Documented cases of allergic asthma to formaldehyde are few and controversial.*(9–12)* Many of these reports are anecdotal.

There have been many cases reported of asthma-like symptoms after exposures to formalin and other formaldehyde-containing solutions. In these cases, it has not been shown that formaldehyde, and not another contaminant or reaction product, was the causative agent. Almost all of these studies have involved exposures to formalin or phenol-formaldehyde chemicals and not to formaldehyde gas.*(11)* These studies *(9,10,13,14,15)* have involved pathologists and their technicians, rubber workers, hospital laboratory staffs, and dialysis nurses. Many of these published accounts of "positive" formaldehyde challenges in patients with asthma lacked adequate controls, and the subjects tested were exposed to unknown but possible high concentrations of formaldehyde gas or its reaction products.

It is very difficult to deliver accurately a specific concentration of formaldehyde gas because of its reactivity with rubber and plastics, its self-polymerization, and its high solubility in water. Like many strong pulmonary irritants, formaldehyde gas can induce a bronchiospasm by strong irritation. This bronchiospasm increases airway resistance and results in shortness of breath or difficulty breathing, which are similiar to the symptoms of asthma. This is different from a true asthma, which produces a bronchiospasm through an immune or pharmacologic reaction. Also, the bronchiospasms associated with formaldehyde-containing materials appear to be reversible and with no permanent effects. To date no circulating formaldehyde—specific immunoglobin (IgE, IgG) has been identified. It appears that if formaldehyde induces asthma, it does so rarely. More importantly, people with an existing asthma should be aware that the irritating properties of formaldehyde can aggravate their condition.

Dose Response Information About Formaldehyde

Health Effects	*Approximately Concentrations ppm*
None reported	0–0.05
Neurophysiologic effects	0.05–1.5
Odor threshold	0.05–1.0
Eye irritation	0.01–2.0
Upper airway irritation	0.10–25
Lower airway and pulmonary effects	5–30
Pulmonary edema, inflammation, pneumonia	50–100
Death	100+

The threshold for a particular dose-response relationship is extremely variable. The odor threshold for most people is about 1.0 ppm; however, some people can detect it as low as 0.05 ppm. Formaldehyde can induce an olfactory fatigue to many other chemicals. This fatigue can produce a potentially dangerous safety situation when a person is unable to detect the presence of other potentially harmful chemicals in the air. The air concentrations that have been associated with complaint levels are often below the odor threshold. Below 0.3 there is not a good linear dose-response relationship for eye irritation. Between 0.3 ppm and 1.0 ppm a linear relationship between number of eye irritation complaints and air concentration levels has been reported.*(16,17)* Above 1.2 ppm the complaints about eye and nose irritation are widespread.

Under test conditions, formaldehyde inhalation has induced squamous cell carcinoma in the nasomaxillary epithelium of rats exposed to formaldehyde at 15 ppm, 6 h/d, 5d/wk for 18 months.*(18)* Similar results have not been found for mice exposed at the same concentration. Basal cell hyperplasia and squamous cell metaplasia in the tracheobronchial epithelium (with no tumors) have been reported in mice exposed to high concentrations for about 8 months.

Formaldehyde has been shown to be mutagenic in several nonmammalian tests (microorganisms and juvenile insects), but was negative in the standard Ames test. The mutagenic potential in mammalian systems has not been thoroughly studied, and more research is necessary to ascertain the potential of formaldehyde to cause mutations in germinal or somatic mammalian cells. There was no evidence of adverse gonadotropic or reproductive effects, not teratogenesis in the studies performed on rats and dogs.*(19,20)*

Paul R. Scoville

Impinger method for collecting formaldehyde.

Formaldehyde Offgassing

There are several factors that determine formaldehyde release from a parent material and the subsequent air concentrations. With particle board as the source, the air concentration in a mobile home doubled from 0.79 ppm to 1.60 ppm when the ambient air temperature increased from 80° F to 85° F.*(21,22)* LCDR Turner, *et al.*, also reported that elevated temperatures were one of the contributing factors in the offgassing of the sandpaper aboard ship.*(7)* Other factors that determine the release from particle board include humidity, light exposure, surface area of the emission source, the quality and formulation of the orginal mixing, age of the component, and the ventilation rate and volume of the space.

Formaldehyde air concentrations can be produced from a material by diffusion of formaldehyde out of the material, decomposition of the material (incineration, steam contact), and environmental degradation (light, warm temperatures, humidity). The authors have measured up to 8 ppm during steam pressing of new permapress clothing that under normal conditions offgassed only trace amounts of formaldehyde. As would be expected from this list of variables, the emission half-life (time to decrease by 50 percent of the original rate) in a material is highly variable. On the average, formaldehyde air levels decline rapidly over the first year, and thereafter tend to decline gradually.

From studies conducted on urea-formaldehyde foam insulated homes in the United States, the emission half-life was reported to range from 45 to 110 days,*(23)* while in a Scandinavian study, the half-life was about 2 years at a ventilation rate of 0.3 air changes per hours. (The United States study did not provide the ventilation rate.) There have been several studies reporting half-life emissions in buildings, with most of the results being between these two rates. From air samples taken in mobile homes in Florida, the authors have found formaldehyde levels up to 1.8 ppm 4 years after fabrication of the mobile home.

From an occupational standpoint, this information may be of concern to those who use or are planning to use mobile homes or other premanufactured structures as temporary office spaces or classrooms. Air concentrations up to 1.6 ppm have been measured in mobile home trailers that were used as temporary office space for the administrative personnel of a community police department. This group reported eye and throat irritation, headache, fatigue, shortness of breath, and chest tightness 2 years after the mobile homes had been constructed. (The actual source of the formaldehyde was not determined; however, the urea-formaldehyde bonding agents in the particle board and plywood were suspected to be the primary sources.)

In summary, we should be aware of our possible exposures to formaldehyde both in the workplace and at home. Also, we should be aware that the air concentration that produces an effect is highly variable within the population, and that the long-term effects are not well known. For these reasons, exposures to the lowest levels possible should be our goal. The best method to insure that the lowest levels are achieved is by not purchasing products that contain formaldehyde or formaldehyde-compounds. If you live in a home that you suspect was made with particle board or plywood and is still offgassing formaldehyde, try to keep the house as open as is practical. Should you suspect a formaldehyde exposure at the jobsite or at home, contact a certified industrial hygienist to evaluate the exposure.

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Combat Advanced Trauma Life Support (CATLS)

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In June 1985 U.S. Naval Hospital, Okinawa, Japan, conducted two 8-day Combat Advanced Trauma Life Support (CATLS) courses under the auspices of the Naval Medical Command Pacific Region. The overall success of these courses markedly increased the medical readiness of the commands which participated and greatly broadened the capability of the Pacific Region for training Medical Department personnel in combat casualty care.

In the fall of 1984 the heads of the education and training departments from each of the medical commands in the Pacific Region met with representatives from NAVMEDCOM PACREG. The meeting was held at Naval Medical Clinic, Pearl Harbor to define individual command training requirements, capabilities, and deficiencies. Each participant agreed that the major educational shortfall in their respective commands was the lack of training for Medical Department personnel in the management of combat-related trauma. A single, comprehensive combat casualty treatment course in the Pacific would alleviate this problem and save the government considerable time and expense. Because of its central location and ready access to U.S. Marine Corps support, U.S. NAVHOSP Okinawa assumed responsibility for its coordination and conduction.

Planning for the course began immediately. The goal was to design a course which would teach state-of-the-art trauma care, as defined by the content of the American College of Surgeons' Advanced Trauma Life Support (ATLS) course, to medical care providers in a combat field environment. Hence, arose the title for the course, Combat Advanced Trauma Life Support (CATLS).

To provide the students with maximum exposure to combat-related

NBC field exercise

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"Transportation of the Injured" field exercise: Loading and unloading casualties.

hardships, we planned to conduct the entire course in the field. We also integrated the ATLS portion throughout the course rather than confining it to the usual 2½ days at the beginning; ATLS lectures and skill stations were interspersed with combat-related field lectures and exercises. This format allowed students to practice ATLS skills during combat field exercises and better prepared them for both written and practical exams at the end.

Finally, in order to meet all the defined educational needs while minimizing time lost from participating commands, we decided to run two consecutive 8-day courses. This article summarizes and highlights this training experience.

Staff and Logistical Support

The success of CATLS resulted from the combined efforts of several organizations.

Instructors and staff personnel came mostly from the military medical facilities on Okinawa, thereby minimizing TAD expenses. Only two staff members from off-island were required: CAPT William McDaniels, 7th Fleet Surgeon (an ATLS instructor); and CDR Jeffrey Hutter, Naval Dental Clinic, Pearl Harbor, HI (PACREG Combat Field Exercise Coordinator).

The field support for the course was provided by Third Force Service Support Group (3d FSSG). Third Medical Battalion, 3d FSSG provided a 60-bed field medical company (MEDCO), educational and berthing tents, outlying medical facilities [battalion aid station (BAS) and evacuation station (evac station)] and much of the field supplies, logistics, and expertise to support both training and survival requirements.

In addition, 3d FSSG marines from 3d Maintenance Battalion, 3d Supply Battalion, and H&S Battalion served as casualty players during the combat field exercises; marines of Bravo Company, 9th Engineer Support Battalion, 3d FSSG constructed an extremely challenging litter obstacle course.

First Marine Aircraft Wing provided air support: helicopters for static displays during the "Transportation of the Injured" field exercise, and air evacuation of casualties during the combat field exercises.

Marines from Alpha Company, 1st Battalion, 3d Marine Regiment, 3d Marine Division, better known as the "A Team," provided the training in combat skills during the combat field exercises. Corpsmen from this same battalion manned the evac station.

Finally, the Army veterinarian clinic, Kadena AB, supervised the acquisition and management of animals used in the ATLS surgical practicum.

The Course

Each course began at the Naval Hospital where the participants were assembled into squads of 10 students with an MSC officer as the squad leader. Five-ton trucks transported the students from the hospital 12 miles north to Onna Point, the site of MEDCO and the CATLS's home base.

The first order of business was setting up the student berthing facilities at the CATLS area. Each squad received instruction from tent specialists and then erected its own G-P medium tent, which would serve as home for the next 8 days.

The education area, constructed along with the MEDCO, was also in the CATLS area. The lecture tent was two conjoined G-P medium tents, one of which was hard backed with an A frame, wooden floor, and supporting beams. This tent was equipped with desks, TV monitors, video recorders, projectors, and broadcast systems. In amphitheater design were three additional G-P medium tents facing the lecture tent. These served as the sites for skill stations.

Messing facilities were at the MEDCO. The Naval Hospital trucked hot meals out to the campsite daily for breakfast and dinner; all lunches and all meals during the combat field exercises were prepackaged rations (MRE's).

"CATLS Country" was complete and the course began at noon the first day. The students assembled in the lecture tent for a welcome aboard and introductory remarks.

During the next 4 days most of the ATLS course material and combat medicine lectures and field exercises were provided. The students participated in the "Transportation of the Injured" field exercise, loading and unloading casualties from both field vehicles and helicopters which had been prepositioned as static displays. They learned the eight standard litter carrys and practiced them on a very challenging litter obstacle course, complete with thick overbrush, barbed wire, "Dead Man's Drop," and "The Pit." A "Bandaging and Splinting" exercise provided the students with a hands on opportunity to apply dressings to maxillofacial, abdominal, thoracic, and extremity wounds. The NBC Defense Officer, 3d FSSG, presented a lecture at MCB, Camp Hansen dealing with individual protective measures, decontamination procedures, and emergency medical care for contaminated casualties. The students then donned MOPP gear and gained confidence in its effectiveness with a CS gas chamber drill.

Student and squad corpsman assess casualty during combat field exercises.

Returning patrols transport casualty back to BAS.

Students move casualty from BAS to vehicle for transport to evac station.

Combat Field Exercises

By the fifth day the squads had become close knit teams and a "lifeboat" psychology was in full swing. The participants were helping each other with needs ranging from bare survival to complex and unfamiliar surgical principles. They had received all didactic material from ATLS and other aspects of combat medicine and were ready to move out and apply their knowledge and skills in a simulated combat environment. For the next 2 days they would each have the opportunity to treat casualties in a BAS, evac station, and MEDCO and learn combat skills firsthand from marines.

All students were given instruction on the M-16 rifle and an intel/ops brief by the "A Team" company commander before being assigned their roles. Half the squads remained at the MEDCO to staff the Shock and Surgical Team (SST) tent, while the other half were transported to a mountainous Marine training range about 2 miles from the CATLS area. Upon arrival at Range 7, the students secured their gear and assumed their assigned jobs at the BAS, the evac station, or the Marine patrol squads.

At 1400 the combat field exercises began. For the next 4 hours the students were subjected to a mass casualty situation in which moulaged victims were transported from the field through the BAS and evac station, and finally to the MEDCO and definitive treatment. The students were to use all the ATLS skills they had learned. ATLS instructors stationed at each medical echelon drilled them repeatedly. Each casualty became a practical exam in triage, initial assessment, resuscitation, and evacuation. The students also participated in casualty transportation by land vehicles and UH-1, CH-46, and CH-53 helicopters from the evac station. Halfway into the exercise, the students assigned to the BAS and evac station switched roles, allowing each participant to work at both of these treatment areas.

Meanwhile, the students assigned to the Marine patrol squads were issued M-16 rifles with blank cartridges and instructed in the application of camouflage make-up. They were familiarized with field weapons and taught the defense of a position against an enemy using conventional weapons and chemicals. They also traversed a ravine using a rope pulley and were taken on a recon patrol during which aggressor forces were encountered and casualties sustained. The squad corpsmen assisted the students with treatment and evacuation of these casualties to the BAS.

The first segment of the combat field exercise was secured at 1830. The students assigned to the MEDCO spent the night studying, while those at Range 7 prepared for a night in the field. They staked out their campsite with the marines, combined shelter halves to make two-person tents, and ate their MRE's. At sunset they joined the marines for a night ambush patrol in which they encountered aggressor forces, gas warfare, and searched wounded enemy personnel. The students were in bed by 2400, while actual sleep took a little longer.

The exercise resumed at 0730 the following morning. Students assigned to the BAS and evac station switched places with those assigned to the marine patrols. At 1200, the first exercise was secured and the squads from Range 7 went back to the CATLS area.

After an interim debrief the students from the field switched with those from MEDCO and the entire exercise was repeated. A total of about 300 simulated casualties were routed through the four treatment areas: patrols, BAS, evac station, and MEDCO.

Exams and Graduation

After the combat field exercise ended at 1200, the students devoted the remainder of the seventh day to rest and study. On the eighth day they took both the written and practical ATLS exams.

The feeling of team spirit reached its final peak at graduation on the ninth day. The assembled squads received their special awards and each participant marched up to receive a certificate of completion.

Conclusion

A total of 99 Medical Department personnel (79 Navy, 19 Air Force, and 1 Army) from 12 commands in the Pacific participated in the CATLS courses. The corps breakdown was MC-26, NC-20, DC-36, MSC/PA-14, and AF paramedic rescue-3.

Ninety-nine percent of the participants passed both the written and practical ATLS exams.

The CATLS courses were both educationally and financially successful. The 1 percent failure rate in ATLS is an unprecedented achievement in a course of this kind and was especially notable in view of the large number of nonphysician students. The extremely low failure rate also lends credibility to the strategy of integrating ATLS lectures and skill stations with combat-related field exercises and having the students take the exams at the conclusion of the course.

The students' outstanding performance on the initial assessment exam must be attributed to the instruction and practice they continually received at the BAS, evac station, and MEDCO during the combat field exercises. The students were repeatedly forced to think of the fundamentals of high quality trauma care while continuing to deal with the urgencies and priorities of a combat environment. Experienced ATLS instructors repeatedly commented that the students' overall performance on the practical exams was the finest they had ever seen.

TAD expenses were minimal; the majority of the students were on authorization orders. Off-island participants requiring billeting prior to and after the course stayed on a contingency ward at the Naval Hospital. Most of the disposables for the skill stations and field exercises were expired items collected from the hospital and from Medical Logistics Company, 3d Supply Battalion, 3d FSSG. Instruments for the surgical practicum were borrowed from the MEDCO, and animals were obtained from the city pound at no cost. All chairs, desks, and training aids were from the hospital's Education and Training Department or borrowed from the Audiovisual Center at MCB, Camp Butler. The only significant costs were for the purchase of ATLS manuals and training aids, construction of transport kennels, and disposal of the animals.

The use of amphitheater design for the presentation of lectures and skill stations worked extremely well. During the lectures, a small group of troupers dubbed the "Roadies" (3 corpsmen and 2 NC officers from the Education and Training Department) were able to set up all the skill stations. This allowed a smooth transition from didactic to practical application of the learned skills.

The spirit and "can do" attitude exhibited by both the students and staff was exceptional, despite the horrendous weather conditions experienced during the first course. Rain fell for 2 weeks prior and throughout the first course. The area became known as "Camp Swampy" and the mud reached heroic depths as it was churned by heavy vehicles and parading troops. As the grounds grew soggier, spirits grew brighter; all participants seemed to rise to the challenges imposed by the environment. Instructors improvised despite frequent power failures, driving rain against the tent canvas, and even a waterfall cascading between them and the students where the two tents were joined.

The CATLS experience provided documentably excellent training in an area of the highest priority for Navy medicine—the management of combat casualties. Both courses proved to be an efficient, cost-effective means of training Medical Department personnel in combat casualty care. The concept of using a centralized location in a geographical command and predominately local resources may be a solution for other geographical commands with similar training needs.

The CATLS course will be reevaluated, updated, and presented as often as the needs of the Pacific Region dictate. □

Photos by U.S. Marine Corps

Corpsmen unload casualties at evac station.

Tumor Markers

William Hamilton, M.D. Luna Ghosh, M.D. Bimal C. Ghosh, M.D., F.A.C.S.

Tumor markers generated a great interest early in the 20th century when Paul Ehrlich suggested antitumor antibodies might be able to target cytoxic drugs to tumor cells.(*1*) There was very limited experimental evidence about the presence of tumor specific markers in spontaneously developing human tumors. There are, however, available today, certain laboratory tests which can serve as useful markers for some human cancers. These include carcino-embryonic antigen (CEA)(*2*) for cancer of the alimentary tract (particularly the large intestine), serum acid phosphatase for carcinoma of the prostate,(*3*) five hydroxyindolacetic acid in the urine for the carcinoid tumors, vanilylmandelic acid and homovanillic acid levels in the urine (which are very suggestive in the diagnosis of neuroblastomas in infants and children and of value in following the progress of these tumors after surgery,(*4*) thyrocalcitonin for medullary carcinoma of the thyroid,(*5*) and alpha-feto-protein for the diagnosis of the carcinoma of the liver and some malignant testicular tumors.(*6,7*) The beta subunit of chorionic gonadotropin in the patients with malignant teratoma of the testes(*7*) and estrogen receptor assay of breast tissue(*8*) have come to attention recently. There are many other antibodies in the blood circulation which have been found in patients with melanoma, soft tissue sarcoma, osteogenic sarcoma, and renal cell carcinomas.

The report in 1965 by Gold and Freedman(*2*) concerning CEA was a stimulus to search for tumor markers. CEA is a glycoprotein extract from colon carcinomas and was thought originally to be specific for adenomatous carcinomas arising from the gastrointestinal tract and pancreas, particularly the large intestine. The concentration of CEA in circulating of body fluids depends on tissue production, its release from tissue into the body fluid, and its clearance. CEA, may be found in malignancies other than the gastrointestinal tract, such as lung, ovary, medullary thyroid carcinoma, and breast carcinoma. More recently, CEA has been found to be elevated in patients with sarcomas and lymphomas. CEA can also be found elevated in patient nonmalignant conditions, such as pancreatitis, alcoholic cirrhosis, cholecystitis, and ulcerative colitis. The liver plays a significant role in plasma clearance of CEA, but the exact mechanism of metabolism is not known. Although CEA may not be ideal, it is extremely helpful in monitoring colon carcinoma in detecting early recurrence of metastasis of the tumor. It is also helpful for second look procedures in certain types of cancer for resection and in sometimes detecting a small liver metastases. Recently, the use of highly specific monoclonal antibodies has improved the consistency and specificity of the test.

Cancer of the prostate is one of the major cancers in the United States and carries a significant morbidity and mortality. In the early 1940's, Huggins(*9*) opened the door for the study of markers in prostate cancer by revealing the response to estrogen and subsequently demonstrating the relation of phosphatase in prostate cancer. Serum acid phosphatase activity is increased in patients with carcinoma of the prostate but this determination has not been a useful tool for early diagnosis of prostate cancer. Tumors of the prostate seem to have significant relation to hormones, such as androgen, testosterone, and estrogen which have specific actions. Although no unit biological markers for prostate cancer have been identified, prostatic acid phosphatase has been used for many years for staging and treatment of prostate cancer. Alkaline phosphatases are found throughout the body, particularly in bone, liver, intestine, and placenta. Alkaline phosphatase is not tumor specific. It may indicate

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bone metastasis when it is elevated in prostate cancer. Other markers which may be useful in the diagnosis and treatment of cancer of the prostate are prostate specific antigen, lactate dehydrogenase, serum ribonuclease, alpha-feto-protein, human chorionic gonadotropin, CEA, cholesterol, hydroxyproline, spermidine, and creatinine kinase. Until a single specific phosphatase marker is developed, it is necessary to use a combination of many of these markers.

The discovery of alpha-feto-protein, (*10*) in 1963 improved the understanding of hepatocellular carcinoma. Malignant tumors in the liver, both primary and metastatic carries a grave prognosis. Many metastatic tumors from the gastrointestinal tract, particularly from the colon, have a predilection for the liver. Although a strict cause and effect has not been established, alphatoxin, which is present in peanuts and other foods, is known to be related to liver cancer.(*6*) Alpha-feto-protein, which is structually similar to albumen, is normally produced in liver tissue. Carcinoma embryonic antigen is also present in minute quantities in normal adult tissues, but is also a very significant marker in metastatic liver cancer. Although no single marker for liver cancer is identified, a combination of changes of certain proteins and enzymes may lead to the diagnosis and therapy of liver tumors.(*11*)

Carcinoma of the pancreas is usually diagnosed late and carries a significant morbidity ·and mortality. The advent of the monoclonal antibody technology has made a significant impact on the embryological diagnosis of human tumors. Metzgar(*12*) has identified five murine monoclonal antibodies to the human pancreatic cells and has established specificity of these antibodies by testing on fetal and adult tissues. The antigens detected by DU-PAN-4 and DU-PAN-5 monoclonals have a more unique distribution on normal and malignant cell types.

A search for biological markers for breast carcinoma has been extensive, but none have been found with a high degree of specificity and sensitivity. Certain markers, such as CEA, ferritin, chorionic gonadotropin, casein, lactalbumin, sialyltransferases, and pregnancy specific B1 glycoprotein have some prospects in the diagnosis and the treatment of breast cancer. Biochemical markers for diagnosis and early recurrence of breast cancer may be enhanced with monoclonal antibodies. This technology may help in localization of tumor cells by the use of microscopic staining with the radio-labeled antibodies or isolating the circulating antigen by a monoclonal antibody in vitro test. In the future, deoxyribonucleic acid (DNA) probing technology may also be very helpful in identifying markers for diagnosis and treatment of breast cancer.

Identification of various markers in testicular cancer is one of the major areas with progress in the management of cancer. The specific markers that are helpful in the diagnosis and treatment of testicular cancer alpha-feto-protein, human chorionic gonadotropin, placental alkaline phosphatase, gama-glutamyl-transpeptidase, placental proteins 5, 10, 15, and pregnancy specific glycoprotein. Immunoperoxidase can localize these antigens and many hormones within the tumor cells and classify testicular tumors to seminoma, embryonal carcinoma, choriocarcinoma, yolk sac tumor, teratoma, and mixed tumors.

During the last decade there has been significant progress in the development of markers in gynecological cancer. The markers that are presently useful in the management of gynecological cancer are CEA, alpha-feto-protein, human chorionic gonadotropin, human placental lactogen, regan isoenzyme, and other antigens such as DA-4, CA-125, OCEA, OCA, NB-70K. Although several other tumor markers have been identified and are being used in clinical trials none is yet an ideal marker.

Melanoma is widely thought to be rare in the United States. This tumor has been shown to induce antitumor immune reactivity as demonstrated by spontaneous regression. Monoclonal antibody technology has opened a spectrum in study of the markers in melanoma. A 250 dalton proteoglycon tumor associated antigen is thought to have the greatest degree of specificity. A 97K dalton glycoprotein is also present in variable quantities on the membranes of melanoma cells. With the advancement of genetic engineering and molecular biology, an immunotherapeutic approach of melanoma with monoclonal antibodies seems to be possible in the near future.

Lung cancer is the leading fatal cancer in the United States. With the development of immunohistochemistry and with monoclonal antibody technology, it is possible to identify certain markers in lung cancer. A variety of immune studies with the use of monoclonal antibodies has opened a new era of staging and treatment. There are four different histological types of lung cancer: squamous cell carcinoma, adenocarcinoma, and large cell lung carcinoma, which also may be classified as non-small cell lung cancers (NSCLS). The other variety of lung cancer is known as small cell lung cancer (SCLC). With the development of immunohistochemistry and monoclonal antibody technology, it has become possible to identify certain tumor-associated antigens (markers) in lung cancer. Monoclonal antibody 534F8 was found to bind 82 percent of SCLC and 40 percent of NSCLC. Monoclonal antibody 703D4 binds to 11 percent of SCLC and over 90 percent to NSCLC. Another marker which has potential for differentiating SCLC from NSCLC is the expression of HLA and beta microglobulin antigen. C-Myc oncogene has been described in several small cell lung cancers and an occasional non-small cell lung cancer. Intravenously delivered monoclonal antibody has helped target malignant tissues in different areas and staged the patients appropriately. It may eventually help to destroy the tumor cells selectively and open a new area for treatment of lung cancer.

Modern development of immunologic technique has helped in classifying malignant lymphomas and leukemias and has shown their relationship to normal immune and hemopoietic system. Identification of "B" and "T" cell markers is possible on the malignant cells, subclassifying them into major categories.

Recent advances in the hybridoma-monoclonal antibody technology and genecloning have produced a significant impact on the diagnosis and management of malignant tumors. Biochemical immunological and immunohistochemical techniques have successfully identified oncofetal antigens, enzymes, hormones, metabolic products, paraprotein, glycoprotein, and glycolipids. With the advent of the new technology, perhaps in the near future, a specific marker for the diagnosis and management of major cancers could be identified and will change the outlook of this dreadful disease.

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NAVMEDMATSUPPCOM

The Naval Medical Materiel Support Command (NAVMEDMATSUPPCOM) has been relocated from Philadelphia, PA, to its new site at Fort Detrick, Frederick, MD, effective 1 Oct 1986. The move will enable NAVMEDMATSUPPCOM to be close to their Army and Air Force counterpart agencies and also the Defense Medical Standardization Board. The mission will continue to provide and coordinate medical and dental material support services for naval medical and dental activities worldwide. Future editions of the *Navy Medical and Dental Materiel Bulletin* (NAVMEDMATSUPPCOMNOTE 6700) will have the new organizational directory.

The Clinical Crown for a Transitional Restoration

LT C.R. Anderegg, Jr., DC, USNR Clayton Fuller, D.D.S.

The restoration of a fractured tooth is important functionally and esthetically especially when it concerns a highly visible anterior tooth. With the newer, better techniques and materials, and the proven success rate of the single-visit endodontic treatment, it is possible to restore esthetics as well as function in a quick and effective manner. Simonsen(*1*) describes a technique for reattaching fractured incisal edges by using internal bevels in the enamel and bonding the edges back in place. Of course, a fracture involving the pulp tissue requires special attention. Ludlow and LaTurno(*2*) showed that the one-visit endodontic procedure and dentinal bonding reattachment could be used successfully. Due to the nature of the fracture in this case, the need of a post for retention necessitated completion of the root canal therapy at a single visit.

Patient Report

A 21-year-old male was struck in the mouth with a fist. Radiographs were taken and revealed a horizontal fracture of the maxillary cuspid. Clinical examination revealed a severely mobile cuspid. The fracture line occurred approximately 1 mm apical to the free gingival margin and involved dentin and pulp. The fracture produced a very clean break, with perfect continuity along the surface of the two halves. The patient was anesthetized and the clinical crown easily removed. The remaining tooth was isolated with a rubber dam. Single-visit endodontic therapy was performed. The canal was obturated with gutta percha using the lateral condensation technique.

The remaining pulp tissue in the coronal portion of the tooth was removed. Both the coronal and apical portions were prepared to accept a post. A Para-post (Whaledent International) was cemented into the coronal portion using zinc phosphate cement. Once the cement dried, the crown was cemented to the retained apical portion (Figure 1). The occlusion was checked and relieved to prevent unnecessary stress on the tooth.

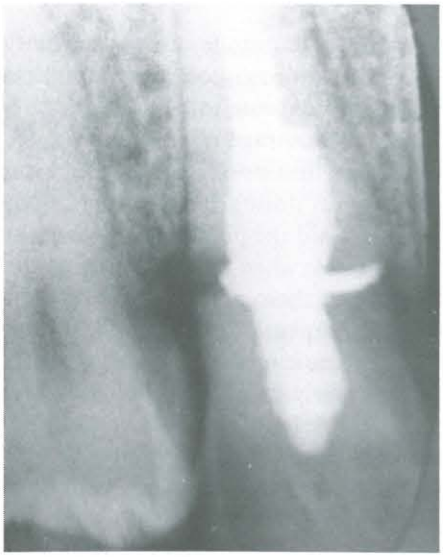

Figure 1

Discussion

The patient was fortunate that the fracture occurred above the level of the bone. The clean and even nature of the fracture was instrumental in how this case was handled. The evenly fractured area provided a positive seating for the clinical crown. If the fractured edge was chipped and fragmented, an acid-etched composite resin restoration could have been used to fill in the uneven marginal areas between the fractured sections.

Another important consideration was that of cement film thickness. Thin cement film thickness is important for this butt-type of joint. It is imperative that the margins be planed smooth with no excess cement that will create an inflammatory response. Still, some leakage occurred, as seen in Figure 1.

Patient discomfort was minimal. Pekruhn(*3*) concluded in his article that from the point of view of painfulness to the patient, single-visit endodontic therapy appears at least equal in desirability to multiple-visit therapy. The procedure took only 1½ hours and provided the patient with a highly esthetic and functional tooth. At a later date, when more time was available, a conventional and definitive prosthesis was constructed.

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Aminoglycoside Dosing

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Despite the multitude of new antibiotics available to the physician, aminoglycosides (gentamicin, tobramycin, and amikacin) continue to be used due to lower unit cost and "holes" in coverage of the newer agents. However, most physicians find dosing the aminoglycosides to be confusing. Several dosing formulas and nomograms have been devised to aid the physician(*1–4*) but are often forgotten or not available when the initial orders are written for administration of these potentially toxic drugs. Since achieving initial therapeutic levels can spell the difference between life and death in seriously ill patients, it is important to dose properly from the onset of treatment.(*5,6*)

At Naval Hospital, San Diego the Infectious Disease Division devised a simple method of calculating aminoglycoside dosing, which has proven useful to the house staff and ourselves. The following is a discussion of our method for calculating aminoglycoside dosing at the start of therapy before serum levels are available.

Since the aminoglycosides are primarily cleared by the kidneys and clearance is linearly related to the clearance of creatinine, the first step is to determine the creatinine clearance (CrCl), by using the Cockcroft Gault equation:(*7*)

$$\text{CrCl ml/min} = \frac{(140\text{—Age in years})\ (\text{Lean weight in kg})}{(72)\ (\text{Serum creatinine mg/dl})}$$

The CrCl is multiplied by .85 for females. The lean weight in kg can be estimated or calculated by using the formula:

male = 50 kg + 2.3 kg for each inch over 5 feet
female = 45 kg + 2.3 kg for each inch over 5 feet

The next step is to adjust your aminoglycoside dosage to the CrCl. (100 ml/min is used as our standard.) Divide the standard, 100 ml/min, by your calculated CrCl.

CrCl

Example:
50 ml/min (100 ml/min)/(50 ml/min) = 2
33.5 ml/min (100 ml/min)/(33.5 ml/min) = 3
125 ml/min (100 ml/min)/(125 ml/min) = .8

This number is then used to determine your 24-hour total dose of aminoglycoside. The normal total daily dose for gentamicin and tobramycin is 5 mg/kg and for amikacin 15 mg/kg.

Example: For an 80 kg male, the total daily dose is:

Gentamicin
80 kg × 5 mg/kg = 400 mg

Amikacin
80 kg × 15 mg/kg = 1200 mg

Divide this total daily dose by the number generated when 100 ml/min is divided by the calculated CrCl of the patient.

Example: (100 ml/min)/(50 ml/min) = 2

For an 80 kg male who is going to receive gentamicin, the normal daily dose would be 400 mg, but with his reduced CrCl we calculate: 400 mg/2 = 200 mg total daily dose.

Next is the determination of your dosing interval. The literature dealing with aminoglycoside dosing can best be summarized by Lietman, who states "Having derived a reduced daily maintenance dose, there are two commonly advocated methods of giving the reduced dose. One can either reduce the individual dose given at the usual dosage interval or give the usual individual dose at less frequent intervals."(*4*) In our experience, where we routinely follow 10–20 patients/week on aminoglycosides, we have found that Q 8-hour dosing works well for individuals with CrCl > 70 cc/min and/or are less than 50 years of age. Variable/extended interval dosing appears to predict consistently therapeutic, nontoxic serum levels in patients with CrCl

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When this article was written the authors were assigned to the Departments of Internal Medicine (Infectious Disease Division) and Clinical Investigation, Naval Hospital, San Diego, CA 92134-5000.

<70 cc/min and/or who are over 50 years of age. Problems that have repeatedly occurred with Q 8-hour dosing in these impaired individuals are (1) inadequate peaks and/or (2) toxic troughs due to drug accumulation secondary to reduced clearance, which prolonged the half life of the aminoglycoside being used. We use the following guidelines for interval determination for those individuals with CrCl <70 cc/min and/or age over 50 years:

1. Age over 50 years	Q 12-hour dosing
2. CrCl <70 ml/min–55 ml/min	Q 12-hour dosing
3. CrCl 54 ml/min–30 ml/min	Q 18-hour dosing
4. CrCl 29 ml/min–15 ml/min	Q 24-hour dosing
5. CrCl <15 ml/min	Q 36-hour dosing

The advantages of prolonging the interval between administrations are that therapeutic peaks (6–10 ug/ml for gentamicin and tobramycin, and 25–30 ug/ml for amikacin) are achieved by infusing a larger dose. Yet toxicity related to elevated trough (>2 ug/ml for gentamicin and tobramycin and <9 ug/ml for amikacin) is reduced due to the increased period between infusions, allowing the drug to be cleared from the body and not accumulate. Studies have correlated successful outcome of gram negative sepsis with adequate peaks and decreased renal toxicity with low troughs.(*1–6*) The minor disadvantages are that Q 18-hour or Q 36-hour administration may be awkward for the supporting health care staff to administer, and with longer intervals, serum levels are drawn less frequently than with standard Q 8-hour dosing. There is also the potential for periods of time with subtherapeutic levels with the prolonged intervals.

This dosing formula is simple to use and individualizes the dosage of the aminoglycoside to the patient's ability to excrete the drug, thus avoiding toxicity and insuring therapeutic serum levels. Many other factors modify aminoglycoside kinetics in the body. The most common are gross edema and ascites. Rough adjustments for these factors can be made by increasing the initial dosing regimen by 10 percent for gross edema and ascites.

It should be remembered that aminoglycosides require a loading dose that is not dependent on CrCl. For gentamicin and tobramycin this is 2 mg/kg and for amikacin 7.5 mg/kg.

The above guidelines are for initiating aminoglycoside therapy. After a loading dose, maintenance dose, and interval have been determined, further adjustments are guided by peak and trough serum levels.

Now let us use our system on a hypothetical patient. Mr. G.N.R. Sepsis is a 60-year-old male who presents with fever and hypotension. Chest X-ray shows a dense infiltrate. Sputum Gram stain shows sheets of PMN's and gram negative rods. Serum creatinine is 1.7 mg/dl. Weight is 70 kg (lean body weight).

1. Determine the CrCl (140–60) (70)/(72) (1.7) = 45.75.
2. Gentamicin is to be used so his normal total daily dose is 5 mg/kg × 70 kg = 350 mg/day.
3. His correction factor is (100 ml/min)/(45.75) = 2.2.
4. His corrected daily maintenance dose is now 350 mg/2.2 = 159 mg (we will round this off to 160 mg). Thus his maintenance dose will be 160 mg 24 hours.
5. We will load him with 2 mg/kg which equals 140 mg and administer his maintenance dose every 18 hours because he has a CrCl = 45 cc/min. Since 18 hours is 3/4 of a day, we would give 3/4 of his calculated daily maintenance dose or 120 mg.

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Dental Correspondence Course on Panoramic Radiography

Panoramic X-ray machines are ideally suited for the mass screening of large numbers of people. Because such machines are used extensively in military clinics and recruit training centers, there has been a great need to provide the military dental community with instruction on the optimum use of the machine and the interpretation of panoramic radiographs. This course, Panoramic Radiography (NAVEDTRA 13140), fills the need.

The text used for this four-assignment course is *Principles and Practice of Panoramic Radiology* by O.E. Langland, R.P. Langlais, and C.R. Morris, published by W.B. Saunders Company, Philadelphia, 1982. An outstanding feature of the text is an abundance of excellent radiographs and illustrations that serve as excellent teaching tools for this highly visual subject matter. The first part of the book introduces the reader to the nature and functions of panoramic radiography, and discusses problems practitioners may encounter when they apply the technique. The second part of the book is devoted to the identification of the radiographic patterns produced by lesions in their mature phases.

Naval Reserve retirement credit is 9 points, to be credited after the four assignments have been completed.

For more information write to: Commanding Officer, Naval Dental Clinic, Naval Medical Command, National Capital Region, Bethesda, MD 20814-5077. Telephone: Autovon 295-0205, Commercial (202) 295-0205.

Cytopathology Course Offered

The Johns Hopkins University School of Medicine is offering the 28th Annual Postgraduate Institute for Pathologists in Clinical Cytopathology. This course is designed as a subspecialty residency in clinical cytopathology and is highly compressed for the busy pathologist into 152 AMA Category I credit hours in two courses, both of which must be taken:

- February through April 1987, Home-Study Course A is provided each registrant for personal reading and microscopic study in their own laboratory.
- 27 April to 8 May 1987, In-Residence Course B is an extremely concentrated lecture series, intensive laboratory studies, and vital clinical experience at the Johns Hopkins Medical Institutions, Baltimore, MD.

These courses are intended solely for pathologists who are certified (or qualified for certification) by the American Board of Pathology or its international equivalent. An intensive refresher in all aspects of clinical cytopathology will be provided with time devoted to newer developments and techniques, special problems, and recent applications including immunodiagnosis and needle aspiration. Topics are covered in lectures, explored in small informal conferences, and discussed over the microscope with the faculty. Abundant self-instructional material is available to maximize learning at each individual's pace.

Course A must be successfully completed before starting Course B on 27 April 1987 in Baltimore. The loan set of slides with texts for Course A will be sent to each participant within the United States and Canada for home-study during February through April. Participants outside of the United States and Canada must make prior special arrangements to study Course A in adequate time before Course B.

The entire course is given in English.

Application and completed pre-registration is advised at the earliest date possible to assure an opening. Completed pre-registration, however, *must* be accomplished *before* 27 March 1987, unless by special arrangement.

For more details write: John K. Frost, M.D., 604 Pathology Building, The Johns Hopkins Hospital, Baltimore, MD 21205.

Free Booklet Explains Harmful Effects of Fat

Most of us don't like to think about fat, whether in our diets or around our waistlines, but its importance to our health makes it a subject we should know more about. A new booklet from the American Institute for Cancer Research (AICR), *"All About Fat and Cancer Risk,"* removes the mystery from dietary fat and makes clear how important the fat in our diet is to the health risks we all face.

According to the booklet, the average American diet gets about 40 percent of its calories in the form of dietary fat. Because of the links which some research has shown between high fat diets and cancers of the breast, stomach, and colon, the AICR recommends reducing fat to 30 percent or less of daily calories. This is similar to the recommendation of the American Heart Association, which cites links between high fat diets and heart disease.

Fat is an important part of our diets, and necessary for good nutrition and good health. But excessive fat in our diets is a definite health risk. To find out more about dietary fat, about the health risks it represents, and tips on how to reduce it in your diet, write for a free copy of *"All About Fat and Cancer Risk."* To receive your copy please send a stamped, addressed, business-sized envelope to: American Institute for Cancer Research, Dept. FC, Washington, DC 20069.

Commissioning Crew, USNAVHOSP, Okinawa

All personnel interested in celebrating the 10th anniversary in Okinawa, Japan, February 1987 should contact: LCDR John E. Kraft, USN (Ret.), 3949 Woodhill Avenue, Las Vegas, NV 89121. Telephone: (702) 458-7118.

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